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Method for Transmitting Television Signals and System for
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Claims

1. Method for transmitting television signals in which a broadcast is transmitted at least partly in digital form, characterized in that a local central processor switches the data selector circuits for parts of the broadcast as a result of at least two consecutive answers by the television viewer and due to the centrally transmitted digital processing program.
2. Method as claimed in Claim 1, characterized in that in the television studio a broadcast is compiled with excess information for branching and with a processing program for the local central processors.
3. Method as claimed in Claim 1, characterized in that the centrally transmitted digital processing program is directed into memories of the controlling central processors in the television cable networks and into memories of the local central processors of television receivers with direct reception.
4. Method as claimed in Claim 1, characterized in that output data of the individual television viewer is entered into the memory of the local central processor.
5. Method as claimed in Claim 1, characterized in that answers of the television viewer are entered into the memory of the local central processor.
6. Method as claimed in Claim 1, characterized in that the centrally transmitted identification data of the individual fragments of a broadcast are entered in the memory of the local central processor.
7. Method as claimed in Claim 1, characterized in that the output signals of the local central processor turn on

and off the audio signals of at least one audio channel with corresponding information requested, respectively, by the individual television viewer.

8. Method as claimed in Claim 1, characterized in that the individual additional audio information in the television receiver in the infrared band is directed to the individual infrared receivers in which, as a function of the viewer's answer, the information is selected and the selected information is forwarded to the infrared receiver arranged next to the ear phones on the head of the corresponding television viewer.
9. Method as claimed in Claim 1, characterized in that the output signals of the local central processor switch the reception from moving pictures to the reception of alphanumeric and graphic characters and vice versa.
10. Method as claimed in Claim 1, characterized in that the output signals of the local central processor switch the selector circuits for the identification data of the individual fragments of the broadcast.
11. Method as claimed in Claim 1, characterized in that the output signals of the local central processor switch the television channels.
12. Method as claimed in Claim 1, characterized in that the output signals of the local central processor turn on the information of the local source.
13. Method as claimed in Claim 1, characterized in that the output signals of the local central processor turn on the recording of the necessary information for the local information source.
14. Method as claimed in Claim 1, characterized in that the output signals of the local central processor turn on the recording of the selected information in the local printer.
15. Method as claimed in Claim 1, characterized in that the output signals of the local central processor enter in the viewfinder of the local camera the contours of the figure overlaid on the centrally transmitted picture, wherein due to the overlay, a broadcast is obtained with participation of an actor, who remains at home under the direction of the director from the television studio during the given broadcast.
16. Method as claimed in Claim 1, characterized in that the television viewer's answer is entered into the memory of the local central processor of the television receiver with direct reception and is output in parallel and converted into telephone signals which comprise a first signal in the form of a code of the new telephone service for transmitting the television viewer's answers, analogous to the known code of conference connections, and a second signal as the answer, wherein these signals are transmitted via the subscriber telephone line to the memory of the local central processor at the telephone exchange,

irrespective of whether the corresponding subscriber telephone line is free or occupied by a telephone connection.

17. Method as claimed in Claim 1, characterized in that the television viewers' answers from an apartment building are multiplexed and supplied via a subscriber telephone line to the local memory of the central processor at the telephone exchange.
18. Method as claimed in Claim 1, characterized in that the answers from viewers that are connected neither to a television cable network nor to the telephone network are registered on magnetic cards suitable for shipping through the mail to the memory of the central processors.
19. Method as claimed in Claim 1, characterized in that the viewers' answers received in the memories of the local central processors in the television cable networks and in the memories of the local central processors at the telephone exchanges are counted and forwarded to the television studio in the form of statistical data, where they are used to correct the transmitted broadcast and the next broadcast from the series.
20. Device for implementing the method as claimed in at least one of the preceding claims, with equipment to transmit at least a portion of the information in digital form, characterized in that, on the receiver side, an input of the local central processor (6) is connected with the circuit for entering the television viewer's answers (2) and a second input with the circuit (3) for entering the centrally transmitted digital processing program and the output of the central processor with a data selector circuit (8).
21. Device as claimed in Claim 20, characterized in that a circuit (35) to enter initial data of the television viewers is connected to the input of the central processor (6).
22. Device as claimed in Claim 20, characterized in that a circuit (34) to enter the television viewers' answers is connected to the input of the central processor (6).
23. Device as claimed in Claim 20, characterized in that a circuit (40) to prefilter the identification data is connected to the input of the central processor (6).
24. Device as claimed in Claim 20, characterized in that the circuit (43) to turn on the audio signal is connected to the output of the central processor (6):

25. Device as claimed in Claim 20, characterized in that the central processor (6) is connected to an infrared receiver (16) and a circuit (20) for turning on the audio signals, which is connected to the infrared receiver (16).
26. Device as claimed in Claim 20, characterized in that the output of the central processor (6) is connected to the multiplex circuit (45).
27. Device as claimed in Claim 20, characterized in that the output of the central processor (6) is connected to a data selector circuit (41).
28. Device as claimed in Claim 20, characterized in that the output of the central processor (6) is connected to the circuit (27) to switch the television channels to select the corresponding fragments of the broadcast.
29. Device as claimed in Claim 20, characterized in that the output of the central processor (6) is connected to the local information source (50).
30. Device as claimed in Claim 20, characterized in that the output of the central processor (6) is connected to the multiplex circuit in the viewfinder of a camera (51).
31. Device as claimed in Claim 20, characterized in that the circuit (34) to enter a television viewer's answers is connected via a control circuit (32) to a prefix generator (29), a subscriber dial number generator (30) and a circuit (31) to generate the television viewer's answer, the signals of which are multiplexed and input into the subscriber telephone line.
32. Device as claimed in Claim 20, characterized in that the circuit (34) to input a television viewer's answers is connected to a recording device (33) in which the television viewer's answers are recorded on a magnetic card.
33. Device as claimed in Claim 20, characterized in that the central processors in the television cable networks and the telephone exchanges are connected to a centralized central processing unit or a central processor from which the statistical data of the television viewers' answers is supplied to the monitor at the television studio.

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Method for Transmitting Television Signals and System for Implementing Said Method

The invention relates to a method for transmitting television signals, particularly to implement interactive television viewing, which makes possible the reception of specially programmed television broadcasts.

Known systems with devices for the reception of television broadcasts and communication between the television viewers and the television studio require the use of a cable network. Such a system, based on the television viewers' answers, e.g., to test questions that are transmitted in the frequency band of between 0 and 30 MHz, sends the individual television viewer's corresponding information on one of the channels in the frequency band of 30 to 300 MHz. The data transmission is centrally controlled by means of a central processor. Such a system is described by E. B. Carne, G. Aaronson, M. Chaurier in "Interactive Television in the United States," Sylvania Videon, 1975 No. 20, pages 22 - 24.

Another known system is based on the local replay of a correspondingly programmed broadcast from a video disk memory or carrier in which a central microprocessor is provided in addition to control the switching of the tracks from which the information is read. Switching depends on the television viewer's answer. (J. L. Bennion, B. W. Schneider: "Interactive Videodiscs Systems for Education," Journal of the SMPTE, December 1975, Volume 84, No. 12, pages 949 - 953.

Furthermore, a videotext system has been developed by means of which centrally transmitted texts and simple images are reproduced on the screen of a television receiver. Although this system offers the television viewer the

possibility of selecting a corresponding page of a text out of a plurality of consecutive pages sent, it does not allow the viewer to communicate with the transmitter (interactive reception of the broadcast). Modifications in the videotext transmission system were described by R. T. Russell in "Teletext Decoder Modifications, Wireless World," January 1978, pages 71 - 72.

The object of the invention is to create a method and a system that permit mass reception of interactive television broadcasts in which the television viewers can answer with "yes" or "no" or a selection from a number of predefined alternatives and can add individual supplements, explanations or other information corresponding to these answers.

According to the invention, this object is attained by the subject of the main claim. Further embodiments are set forth in the dependent claims.

To attain the aforementioned object, modifications on the transmit and the receive side of the system are required. On the transmit side, special broadcasts are prepared involving a significant amount of labor, which have excess data for branching, together with a digital processing program for the individual data fragments that are provided in the broadcast. These broadcasts are transmitted to a plurality of viewers, e.g., by means of space stations, amplifying television stations and by means of local cable television systems with central processor control.

On the receive side, according to the invention, a local central processor is provided in the private television receiver, which switches the data selector systems based on the television viewer's answer and based on the centrally transmitted digital processing program for the broadcast segments (broadcast fragments).

According to the invention, the broadcasts that are transmitted to the greatest number of television viewers, e.g., sports and entertainment programs, i.e., broadcasts that are typically viewed by more than one person on a single television set, are provided with additional information in the form of additional audio signals which are transmitted analogously to the known signals of foreign language translations on audio channels or radio channels, which are provided in addition to the video channel. On the receiver side, according to the invention, the separate variants of the additional information are transmitted in the form of acoustic or audio signals in the television receiver in the infrared band to the individual infrared receivers, which are arranged in the known infrared transmitters for remote control of the television receivers. In these transmitters, the keypad is used in addition in order to enter the television viewer's answers. The central processor, which is embodied, for instance, as an integrated microprocessor having the function of a remote control signal encoder, injects at certain time intervals the information that corresponds to the respective television viewer based on the digital processing program. This information is again forwarded in the infrared band to the infrared receiver arranged next to the ear phones. Additional information in the form of alphanumeric or graphic characters is used less frequently in this type of broadcasts, i.e., only in an area where the attention of other persons using the same television receiver is not unduly distracted.

Broadcasts for a smaller viewer group, such as educational and popular science broadcasts, are provided with additional information in the form of both audio signals and video signals. To this end, the signals of the local central processor switch from the reception of moving pictures to the reception of alphanumeric and graphic characters, likewise the identification data selector circuits for the individual parts (fragments) of the broadcast. The television channels are also switched if the individual fragments of a broadcast can be transmitted in more than one television channel. Furthermore, the output signals of the central processor switch the recording and replay of the information in the local information source.

Another feature of the system according to the invention is the television viewer's participation in the centrally transmitted broadcast in such a way that the output signals of the local central processor insert the contours of the persons designated by the director in the viewfinder of the television camera. The figure of the viewer contained in these contours is overlaid on the main content.

In broadcasts in which an answer or an opinion of the television viewers is desired (in marketing, commercial ordering, in many educational broadcasts, and television quizzes) the viewer's answer is entered into the memory of the local central processor or is output in parallel and converted into telephone signals, i.e., into a special signal—the new service code in the form of a prefix analogous to the known code for conference connections—and the signal of the subscriber's dial number and of the subscriber's answer. These signals are introduced into the subscriber telephone line irrespective of whether this line is currently free or occupied by a telephone connection. An exception hereto is the short time span of ringing signal transmission (transmission of the dialing signal) during which the answer is delayed. These answers, after statistical processing, are forwarded to the monitor at the television studio.

Preferred embodiments of the invention will now be described in greater detail with reference to the drawing in which

- Fig. 1 is a block diagram of the receiving devices of a television system that operates digitally at least in part,
- Fig. 2 is a block diagram of a system that is modified compared to Fig. 1 with a receiver for additional information in the form of audio signals if a broadcast is viewed by more than one person on a television receiver,
- Fig. 3 is a block diagram of a television receiver system with a text decoder to receive digital data,
- Fig. 4 is a block diagram of a circuit that transmits a viewer's answers to a memory of the central processor,

Fig. 5 shows transmitters for infrared rays for the circuit according to Fig. 2.

The block diagram depicted in Fig. 1 comprises a circuit 2 to enter a television viewer's answers and a circuit 3 to input a digital processing program. In addition, a circuit 4 is provided to prefilter the information for television viewers as well as a control circuit 5. A central processing unit or processor 6, e.g., an integrated microprocessor, supplies the digital processing program, a television viewer's answers and the subsequent identification data of the individual parts or fragments of a broadcast to a memory 7 (RAM). The output signals of the central processor 6 control a data selector circuit 8. Provided in addition is a circuit 9 to forward the television viewer's answers to a memory (not depicted in Fig. 1) of an external central processing unit, i.e., an external processor. A circuit 10 serves for conversion of the video signals and for picture illumination. 11 designates a circuit for audio signal recovery.

The block diagram shown in Fig. 2 comprises the central processor 6, which controls an audio signal circuit element 20 in at least one additional audio channel.

12 identifies a keypad and 16 an infrared transmitter. Reference number 14 designates a remote control signal (output of the infrared transmitter 13). Digital data is supplied to an infrared receiver 16. 17 identifies the digital data output of the infrared receiver, while the reference number 18 indicates at least one audio channel. Command 19 represents a command for an audio signal of a corresponding channel, which is supplied to a circuit 20 to add the selected audio channel. 21 identifies an infrared transmitter, which outputs an audio signal in the infrared range with selected additional information. The circuit depicted in Fig. 2 embodies a transmitter for remote control and is identified by 23 while block 24 at the bottom of Fig. 2 represents a retransmission circuit for audio transmission when the selected audio signal is turned on for a time period that is determined by the central processor 6.

In the circuit shown in Fig. 3, a central processor 6 with input and output circuits and with a memory is connected to a television receiver 54 with at least one additional audio channel and to a videotext decoder 56 with one additional data output (hamming decoder). The central processor 6 controls the turning-on or adding-on of the additional audio signals and the turning-on of the additional or exchanged fragments of the video signal content or the video picture content. 25 identifies the supplied video signal. 26 is a control circuit and 27 is the line to switch television channels to a prefiltering of the corresponding fragments of a broadcast. A circuit 34 serves for the remote input of a television viewer's answers and a circuit 35 for the input of the television viewer's initial data. A circuit block 36 causes the digital data of the video signal to be prefiltered. 37 designates a printer. In addition, a multiplexer circuit 38 is provided. The central processor 6 has input circuits 39, which are coupled to a circuit 40 for prefiltering digital processing programs and the identification data of individual broadcast fragments with the input circuits 39 [sic]. A circuit 41 forms a data selector circuit or a circuit to compare the addresses of text information, e.g., page numbers. The local central processor 6 switches the data selector circuits 41 as a result of a television viewer's answers and the digital processing programs, which are directed through the output circuit of the central processor 49. If the addresses match, the subsequently input data is entered in a RAM 44. 42 identifies a generator for alphanumeric and

graphic characters and 43 a circuit for adding or operating additional audio channels of a television receiver 54, which has at least one additional audio channel—as previously mentioned. In addition, a multiplexer circuit 45 is assigned to the receiver 54.

The text decoder identified by 56 furthermore comprises a circuit 47 to prefilter the characters to control the illumination of the image and an output circuit 48 for characters. 49 identifies the output circuit of the central processor 6. Block 50 forms a local information source, for instance a disk memory or the like to store video signals. A multiplexer circuit 51 in the viewfinder of a television camera serves to project the graphic characters onto the picture of the receiver 54 of the [illegible], which is furthermore connected to a receiver 52 for a remote control signal. The remote control signal receiver 52 furthermore supplies signals 53 to television receiver 54 to control it. The receiver 54 finally comprises an output circuit 55 for video signals. A circuit 57 in the decoder 56 serves to prefilter the control signals or commands (e.g., do not illuminate!)

Reference is now made to the block diagram shown in Fig. 4. In this circuit, the viewer's answers are converted into telephone signals with a multifrequency code and are consecutively transmitted over a telephone line unless the telephone subscriber selects a dial number of another telephone subscriber. The circuit shown in Fig. 4 comprises a control circuit 32, which is provided with a prefix generator 29 for a transmission announcement of the television viewer's answer, with a subscriber dial number generator 30, and with a circuit 31 to generate the television viewer's answer. Circuit 34 for the remote input of a television viewer's answers is connected to circuits 31 and 32. 28 designates the control signal for the delay of the answer, which represents the short time span during which the ringing signal is transmitted. During this time span the answer is delayed. The multiplexer is identified by 38 and supplies a signal for the subscriber telephone line 33.

Fig. 5 is a schematic representation of the receiver system depicting a viewer who is watching a broadcast on the receiver 54 together with other viewers. The viewer, through ear phones 64, hears the audio signal transmitted in a first audio channel and additional information in audio form at corresponding time intervals. During the reception of the additional information there is either silence in the first audio channel or the voices in the other two channels differ substantially from one another, e.g., they can be a male and a female voice. Due to divided attention such information can be absorbed, analogously to remarks by occupants of the house, prompting in school, or the like. A photo element 63 is blocked with respect to an infrared source 60, or is correspondingly dimmed while ready to receive an infrared source 62. A unit 58 contains the remote control transmitter 23 and the audio retransmitter 24. Infrared rays 59 transmit remote control signals as well as signals corresponding to a television viewer's answers. These signals correspond to the answers input via device 34. Infrared rays 60 serve to transmit signals of at least one additional audio channel with additional information. A photo element 61 receives the signals 60 in audio form. Infrared rays 62 transmit the audio signals with corresponding variation of the additional information. The photo element 63 receives the audio signals 62. The ear phones for the viewer are identified by 64.

The described method and the system to implement said method make possible interactive television viewing and a [illegible], thus permitting interactive entertainment, learning, marketing, opinion surveys, television quizzes and discussions with television viewers.

In the method according to the invention, the data selector circuit is switched by the local central processor as a result of at least two successive answers of a television viewer and due to the centrally transmitted digital processing programs for the fragments or segments of a broadcast.

On the receiver side the system comprises a local central processor 6, one input of which is connected to a circuit 2 to input the television viewer's answers and the second input of which is connected to a circuit for introducing the digital processing program for parts of the broadcast, which is identified by 8.

For the further structure of the system according to the invention, express reference is made to the circuit connections of the individual blocks in Fig. 1 to 4.

List of Reference Numbers

1. Video signal
2. Circuit to input the television viewer's answers
3. Circuit to input the digital manipulation program / telesoftware /
4. Circuit to prefilter the information for television viewers
5. Control circuit
6. Central processing unit / processor - e.g., integrated microprocessor /
7. Memory / RAM /
8. Data selector circuit
9. Circuit to transmit the answers of the television viewer to the memory of the external central processor
10. Circuit for video signal conversion and picture illumination
11. Circuit for sound signal recovery
12. Keypad
13. Infrared transmitter
14. Remote control signal
15. Digital data and voice with different variants of the additional information
16. Infrared receiver
17. Digital data
18. At least one audio channel
19. Command to turn on the audio of a corresponding channel
20. Circuit to turn on the selected audio channel
21. Infrared transmitter

22. Audio signal in the infrared band with selected additional information
23. Remote control transmitter
24. Retransmission circuit for audio transmission with the selected audio channel turned on for the time period determined by the central processor / 6 /
25. Video signal
26. Control circuit
27. Switching of the television channels for prefiltering the corresponding fragment of a broadcast
28. Brief period of ringing signal transmission during which the answer is delayed
29. Prefix generator for transmission announcement of the television viewer's answer
30. Subscriber dial number generator
31. Circuit to generate the television viewer's answer
32. Control circuit
33. Recording device to record the television viewer's answer on a magnetic card
34. Circuit for remote input of the television viewer's answers
35. Circuit to input the television viewer's initial data
36. Circuit to prefilter the digital data from the video signal
37. Printer
38. Multiplexer circuit
39. Input circuits of the central processor
40. Circuit to prefilter the digital manipulation programs / telesoftware / and the identification data of the individual fragments of the broadcast
41. Data selector circuit or circuit to compare the addresses of teletext information, e.g., page numbers, the local central processor / 6 / switches the data selector circuits based on the television viewer's answers and the digital manipulation programs / telesoftware /, which is directed through the output circuits of the central processor / 49 /; if these addresses match, the subsequently arriving data is entered in the memory / 44 /
42. Generator of alphanumeric and graphic characters
43. Circuit to turn on one of the additional audio channels in the television receiver / 54 /
44. Memory / RAM /
45. Multiplexer circuit
46. Signal output for the subscriber telephone line
47. Circuit for prefiltering the characters to control picture illumination
48. Output circuit for characters
49. Output circuit of the central processor
50. Local information source, e.g., video disk device
51. Multiplexer circuit in the view finder of the television camera to superimpose the graphic characters onto the image

52. Receiver of the remote control signal
53. Signals to control the television receiver
54. Television receiver with at least one additional audio channel
55. Output circuit for video signals
56. Teletext decoder with the additional data output after the hamming decoder
57. Circuit for prefiltering the control character, e.g., a command: do not illuminate
58. Device comprising the remote control transmitter / 23 / and the audio retransmission circuit / 24 /
59. Infrared rays to transmit the remote control signals and the signals of the television viewer's answers / 34 /
60. Infrared rays to transmit the signals of at least one additional audio channel with additional information
61. Photo element to receive the audio signals / 60 /
62. Infrared rays to transmit the audio signals with the selected variant of the additional information
63. Photo element to receive the audio signals / 62 / for the infrared rays / 60 / dimmed
64. Ear phones / for the bone system of the ear /



AFFIDAVIT OF ACCURACY

I, Nathan J. Richards, hereby certify that the following is, to the best of my knowledge and belief, a true and accurate translation of the following documents from German into English.

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Sworn to before me this
28th day of November 2001.

Signature, Notary Public

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